

Having thus described the invention, what is claimed as new and secured by Letters Patent is:

Claims

1. A method of multi-hop relaying within a cellular network having at least one base station, more than one intelligent relays and at least one user equipment element, said method comprising:

- selecting a pilot signal emanating from one of said base station or said more than one intelligent relays based upon strength of said pilot signal at said at least one user equipment element;

- reporting a strongest source of said pilot signal to said base station;

- distributing an active user list, scheduling information, and routing information among said more than one intelligent relays such that said at least one user equipment element is assigned to a corresponding one of said more than one intelligent relays;

- transmitting data from said at least one base station to said more than one intelligent relays;

- detecting an address of said at least one user equipment corresponding to said data transmitted from said at least one base station; and

- forwarding said data to said at least one user equipment.

2. The method as claimed in Claim 1 wherein said distributing step is performed via a relay control channel.

3. The method as claimed in Claim 2 wherein said detecting step is performed at said more than one intelligent relays.

4. An intelligent relay for use within a cellular network, said intelligent relay comprising:

- an uplink transmitter;

- an uplink receiver;

- a downlink transmitter;

a downlink receiver; and

a relay transfer buffer;

wherein said uplink transmitter and said uplink receiver operate simultaneously during uplink transmission and said downlink transmitter and said downlink receiver operate simultaneously during downlink transmission, and said relay transfer buffer operates to facilitate such simultaneous transmissions.

5. The intelligent relay as claimed Claim 4 wherein said intelligent relay is sectorized so as to minimize interference with base station transmissions.
6. The method as claimed in Claim 1 wherein said base station includes a means for power control in coordination with rate control wherein said power control means provides for minimization of interference between base station transmissions and relay transmissions.
7. The intelligent relay as claimed in Claim 5 wherein said intelligent relay is operable with a base station including a means for power control in coordination with rate control wherein said power control means provides for minimization of interference between base station transmissions and relay transmissions by said uplink transmitter and said downlink transmitter.
8. The intelligent relay as claimed in Claim 6 further including a scheduler for quality of service providing decisions on power, rate control, and relay time unit allotments.
9. The intelligent relay as claimed in Claim 8 including more than one said intelligent relay each being locatable in overlapping areas of different beams, sectors, or cells able to communicate with multiple base stations so as to provide load balancing and reduction of path vulnerability.

10. The intelligent relay as claimed in Claim 9 wherein said more than one intelligent relay perform virtual MIMO on an uplink with said multiple base stations and where said base stations include a fast communication link therebetween for collectively processing virtual MIMO transmissions.